

# High-Speed, Permanent Magnet Motor



## New Motor Drive Increases System Efficiency by Allowing Variable Speed Motor Operation

Since rooftop air conditioners were introduced decades ago, alternating current motors have been driving their compressors. Only a few minor modifications have been made to these systems over the years. However, concern over environmental impacts of energy use and growing market demand for cooling are stimulating investment in making air conditioning systems more efficient. Meanwhile, worldwide pressure to improve performance efficiency and minimize the environmental impact of products has sparked the need to rethink the delivery process of conditioned air.

SatCon Technology has developed an improved motor technology with the help of a grant funded by the Department of Energy's Inventions and Innovation Program. The new motor drive has been developed and tested as part of a high-speed centrifugal compressor unit. Additional applications include the semiconductor manufacturing industry and high-temperature systems. The new technology increases the efficiency of air conditioning equipment, has lower operating costs, improves motor efficiency, and can operate in clean environments.

SatCon Technology's high-speed motor drive uses rare earth permanent magnet technology to deliver the power required to a system. The motors are significantly smaller and quieter than traditional motors and up to 15% more efficient, in part because they are able to operate at variable speeds.

## Benefits

### Energy Savings

Higher motor and electronics efficiency reduce energy use by 10% to 15% annually compared with traditional induction motors. A 28-horsepower motor driving a 25-ton centrifugal compressor would save approximately 9000 kWh per year.

### Efficiency

The centrifugal compressor is more efficient than current air conditioning systems. Motor efficiency that is 10% to 15% higher than traditional motors creates additional improvements.

### Productivity

At 100 pounds, the lighter, smaller, and quieter drive offers significant installation savings compared with conventional air conditioning package units with 500-pound compressors.

## Overview

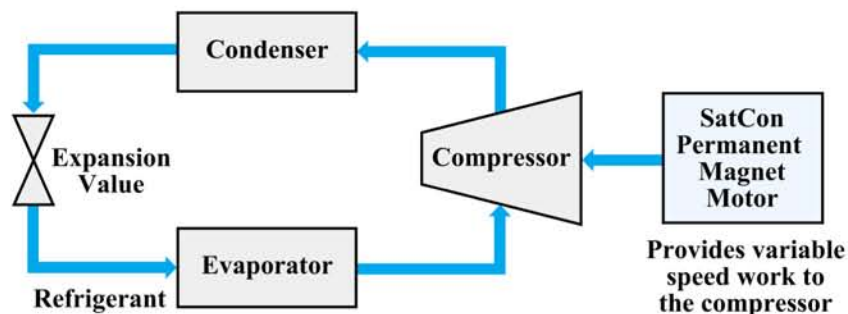
- ◆ Motor system developed and tested by SatCon Technology Corporation
- ◆ Ultra high speed, high efficiency PM motor technology
- ◆ Development completed in 2000

## Applications

- ◆ 25-ton and larger rooftop air conditioning units and centrifugal chillers
- ◆ Rapid thermal processing for manufacturing semiconductors

## Capabilities

- ◆ Reduces overall weight of air conditioning equipment, which is a significant advantage for roof-mounted equipment.
- ◆ Performs reliably for an anticipated 30,000-hour lifetime.
- ◆ Produces less noise than typical induction motors.
- ◆ Operates safely in clean productions facilities (non-contact).
- ◆ Can be used for specialized applications and processes because of high temperature tolerance (1200°C).



*Air Conditioning System Using SatCon Motor*